afforded under previous conditions by the skin, the work of the lungs is greatly increased, rendering them peculiarly susceptible to bronchitis and pneumonia—ailments which are commonly the forerunners of consumption. If we accept the theory of Koch, they make the lungs a suitable habitation for the *Bacillus tuberculosis*." Mr. Wyman contends that, in the case of civilised races, the liability to consumption from overworked lungs has been tempered by hundreds of generations of ancestors habituated to the use of clothing.

In the Report of the U.S. Geological Survey on the mineral resources of the United States for 1885, it is stated that the total mineral product is valued at 428,521,356 dollars, an increase of 15,306,608 dollars over 1884. Among seventy mineral substances cited, coal is the most important, showing a total value of 159,019,596 dollars. An increase is shown in the production of coke, natural gas, gold, silver, copper, zinc, quicksilver, nickel, aluminium, lime, salt, cement, phosphate rock, manganese, and cobalt oxide, while the production of coal, petroleum, pig-iron, lead, precious stones, and mineral waters decreased. According to the Report, it is probable that the total output of 1886 was much greater than that of 1885, and even larger than that of 1882.

We have received the *Annuaire* for 1887 of the Académie Royale des Sciences, des Lettres, et des Beaux-Arts de Belgique. It contains a full account of the organisation of the Academy, and of the means by which it seeks to encourage science, literature, and art. Among the biographical notices are articles on the late Francois Lenormant and Edouard Morren.

An illustrated work, entitled "Les Civilisations de l'Inde," by Dr. Gustave Le Bon, is being issued in weekly parts by Firmin-Didot et Cie. Dr. Gustave Le Bon is the author of a work on "La Civilisation des Arabes."

The Calendar of the Imperial University of Japan for the current year, which we have just received, deserves special mention, for it is the first that has been issued since the amalgamation of the well-known College of Engineering and the University of Tokio into the single institution which forms the new University. This incorporation was made the occasion for several organic changes, one of which is the almost total elimination of Europeans from the teaching staff, their places being taken by Japanese. To understand the full extent of the change in this respect, it is necessary to remember that five or six years ago all the professors in the College of Engineering, and nearly all in the University, were Europeans. An examination of the Calendar shows how the new University stands in this respect. By the Imperial decree, which is the charter of the institution, the Council of Professors regulate the studies and generally look after the interests of the University and each of its Colleges. There is not a single Western amongst the nine Councillors. In the Law College, three out of thirteen professors and lecturers are Westerns; in the Medical Faculty, out of thirty-four professors and assistants, there are three Europeans; there are three Europeans amongst twenty-four professors and assistants in the Faculty of Engineering; two in twenty-six in Science; and three in nineteen in Literature. It is probably not too much to say that, where one European is teaching now, there were six Europeans five years ago. It was only to be expected that ultimately the Japanese would have their own men ready to take the places vacated by Europeans. They had at vast expense sent abroad large numbers of youths to be educated for the various professions in Europe and America, who, on their return, were competent to teach their countrymen; and in looking down the lists of the Japanese professors we see that most of them have foreign degrees and other qualifications. They come from almost every German, French, British, and American University, and in some instances have taken high honours. They may therefore be presumed to be competent for the work which they have undertaken, and there is no special reason to believe that the step taken by the Minister of Public Instruction in placing the higher education of the country in the hands of his countrymen is premature. Be this as it may, it is clear that the day of Europeans in Japanese education is past, and this fact is only emphasised by the few familiar names amongst a host of unfamiliar ones in the list of the University. Moreover, even where there are one or two foreign professors, the direction is all in Japanese hands. The Director and the chief Professor in every Faculty are Japanese, so that if the individuals are fewer in number, the functions and status of each one remaining have also diminished. Time alone will show whether the experiment—for undoubtedly the Imperial University is at present in the experimental stage—will be successful or not. He would be a bold man who, for example, prophesied that the Faculty of Engineering in the new University will maintain the high position won for the old Imperial College of Engineering in the world of science by a body of brilliant European professors, some of whom are now in the front rank at home. In the Calendar there is certainly evidence of much activity. An Astronomical Observatory has been fitted up for the instruction of the students; there is also a Seismological Observatory, with horizontal pendulum and vertical-motion seismographs. By the aid of a complete set of these instruments now in the Observatory, it is possible to measure earth-movements of different grades of magnitude. In addition, a system of telegraphic communication with different parts of the city extends the area of observation. A Botanic Garden and a small Marine Biological Laboratory are likewise attached to the Science Department.

The additions to the Zoological Society's Gardens during the past week include a Green Monkey (*Cercopithecus callitrichus* ♀) from West Africa, presented by Mr. Julius Wilson; a Secretary Vulture (*Serpentarius reptilivorus*) from South Africa, presented by Capt. Larmer, s.s. *Trojan*; a Crowned Hawk Eagle (*Spizaetus coronatus*) from Natal, presented by Colonel H. Bowker, F.Z.S.; a Spotted Eagle Owl (*Bubo maculosa*) from South Africa, presented by Mr. H. Justice; a Brazilian Hangnest (*Icterus jamaicai*) from Brazil, presented by Mr. W. G. Little Gilmour; two Crossbills (*Loxia curvirostris*), British, presented by Mr. W. H. St. Quintin; two White-fronted Lemurs (*Lemur albifrons*) from Madagascar, deposited; a —— Capuchin (*Cebus* ——) from South America; two Chimachima Milvagos (*Milvago chimachima*) from Brazil, purchased.

OUR ASTRONOMICAL COLUMN

The Binary Star δ Equulei.—This close and rapid binary, which was discovered in 1852 by M. O. Struve, and measured on a number of nights between that time and 1874, was supposed by its discoverer to have a period of between 6 and 7 years or one of about 13 years. More recently, Mr. Burnham, who observed the star between 1880 and 1883, concluded from an examination of all the measures that the period was about 10·8 years. It is therefore the most rapid binary now known. At the request of Prof. Glasenapp of St. Petersburg, Herr Wrublewsky (*Astron. Nachr.* No. 2771) has computed a set of elements from all the available observations. He finds the time of periastron passage to be 1892·03, with eccentricity = 0·2011, mean distance, = 0″·406 and period = 11·478 years. These elements do not, however, represent the observed position-angles satisfactorily, and it is desirable that the possessors of sufficiently powerful telescopes should pay some attention to this very interesting object, especially at the present time, when the components are about at their maximum distance apart. Herr Wrublewsky's orbit gives, for 1887·24, position-angle = 204°·9, and distance = 0″·48.

The Temple Observatory.—From the Report of Mr. Seabroke, honorary Curator of the Temple Observatory, Rugby,

© 1887 Nature Publishing Group

we learn that during 1886 Mr. Percy Smith continued the measurement of position-angles and distances of double stars, 88 sets of measures having been secured. These stars have been divided into three categories for future re-measurement, viz. rapid binaries, to be observed every year; slower binaries, to be observed every 4 years; and long-period binaries, to be observed every 10 years. Mr. Seabroke himself has continued the measurement of the motion of stars in the line of sight with the spectroscope on the reflector, and has completed 100 sets of measures. These observations, together with the corresponding ones for previous years, have been published in the January number of the *Monthly Notices*.

DISCOVERY OF A NEW COMET, 1887*d* (BARNARD 2).—A new comet was discovered on February 15 by Mr. E. E. Barnard, Nashville, Tennessee. It was very faint, and was moving rapidly in a north-westerly direction. At midnight (local time) its position was R.A. 8h. 4m., Decl. 16° 10′ S.

PROBABLE NEW VARIABLE.—We learn from Circular No. 15 of the Liverpool Astronomical Society, that Mr. Backhouse finds 28 Andromedæ to be probably variable within small limits. The observations yet obtained are insufficient to fix the period, which must, however, be short. It is possible that the star is of the Algol type.

NAMES OF MINOR PLANETS.—Herr J. Palisa has named Minor Planet No. 256 Walpurga.

BRIGHTNESS AND MASS OF BINARY STARS.—The current number of the *Observatory* contains an article on this subject by Mr. W. H. S. Monck, in which he attempts to deduce the relative brilliancy of those binaries for which the orbits are best determined. Assuming that the mass of the companion-star is very small as compared with that of its primary, he shows that the relative brilliancy of any two pairs of binaries may be found by the following formula:—

$$\frac{k_1}{k_2} = \left(\frac{I_1}{I_2}\right) \cdot \left(\frac{P_1}{P_2}\right)^{\frac{4}{3}} \cdot \left(\frac{a_2}{a_1}\right)^2,$$

where $I_1\, I_2$ stand for the total amount of light, as determined photometrically, which we receive from the two pairs respectively; $P_1\, P_2$ for their periods; and $a_1\, a_2$ for the angular radii of their orbits. By, apparently, a printer's error, the index of $\left(\frac{P_1}{P_2}\right)$ is omitted in the formula in the *Observatory*. Adopting ξ Ursæ Majoris as his unit of comparison, Mr. Monck finds the brilliancy of γ Leonis 93·29; of Castor, 38·24; δ Cygni, 35·52; of Sirius, 7·17; 42 Comæ, 2·79; 6 (*p*) Eridani, 0·20; and 61 Cygni, 0·08. It is noteworthy that Prof. E. C. Pickering, in a paper which appeared in the Proceedings of the American Academy of Arts and Sciences, vol. viii. No. 1, obtained very similar results for many of the same stars, but by a somewhat different process. In both lists γ Leonis figures at the head, followed by Castor and δ Cygni, whilst the smallest values are found for *p* Eridani and 61 Cygni. The weak point in Mr. Monck's computation is the assumption that the mass of the smaller star is comparatively insensible; the near equality in magnitude of many of the binaries selected would seem to indicate that the assumption was not a safe one. Mr. Monck repeats Prof. Pickering's suggestion that series of careful measurements should be made between each component of the binary systems and some neighbouring stars, so that the ratio of the masses of the two components may be determined. It is to be hoped that some double-star observers may be induced to take up this interesting subject, now that attention has again been called to its importance. The research might also possibly supply us in some cases with a determination of the distance of the binary.

THE LIVERPOOL ASTRONOMICAL SOCIETY.—The Pernambuco branch of this Society now numbers more than eighty members, and has been accorded permission to elect a local executive. The Emperor of Brazil has been elected a member of the Society.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1887 *FEBRUARY* 27—*MARCH* 5

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on February 27

Sun rises, 6h. 52m.; souths, 12h. 12m. 56·0s.; sets, 17h. 34m.; decl. on meridian, 8° 21′ S.: Sidereal Time at Sunset, 4h. 3m.

Moon (at First Quarter March 3) rises, 8h. 50m.; souths, 15h. 30m.; sets, 22h. 21m.; decl. on meridian, 7° 9′ N.

Planet	Rises h. m.	Souths h. m.	Sets h. m.	Decl. on meridian ° ′
Mercury	7 17	13 13	19 9	1 36 S.
Venus	7 34	13 31	19 28	1 23 S.
Mars	7 19	13 1	18 43	4 11 S.
Jupiter	22 48*	3 49	8 50	12 8 S.
Saturn	12 30	20 39	4 48*	22 25 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

Occultations of Stars by the Moon (visible at Greenwich)

March	Star	Mag.	Disap. h. m.	Reap. h. m.	Corresponding angles from vertex to right for inverted image ° °
2	Aldebaran	1	17 47	18 4	182 210
4	130 Tauri	6	2 30	2 38	43 25

March	h.	
3	3	Mercury at least distance from the Sun.
5	11	Mercury at greatest elongation from the Sun, 18° east.
5	14	Saturn in conjunction with and 3° 29′ north of the Moon.

Variable Stars

Star	R.A. h. m.	Decl. ° ′		h. m.	
U Cephei	0 52·3	81 16 N.	Mar. 2,	19 57	*m*
Algol	3 0·8	40 31 N.	Feb. 28,	2 54	*m*
			Mar. 2,	23 43	*m*
U Monocerotis	7 25·4	9 33 S.	Feb. 28,		*m*
T Canis Minoris	7 27·7	11 59 N.	,, 28,		*M*
S Cancri	8 37·5	19 26 N.	Mar. 2,	23 26	*m*
R Leonis	9 41·5	11 57 N.	,, 2,		*m*
U Virginis	12 45·4	6 10 N.	,, 5,		*m*
W Virginis	13 20·2	2 48 S.	,, 4,	0 0	*m*
S Boötis	14 19·3	54 20 N.	,, 2,		*M*
δ Libræ	14 54·9	8 4 S.	,, 3,	0 5	*m*
U Coronæ	15 13·6	32 4 N.	Feb. 27,	21 2	*m*
U Ophiuchi	17 10·8	1 20 N.	Mar. 3,	1 8	*m*
			and at intervals of	20 8	
W Sagittarii	17 57·8	29 35 S.	Mar. 3,	4 0	*m*
R Scuti	18 41·5	5 50 S.	,, 3,		*M*
β Lyræ	18 45·9	33 14 N.	,, 5,	20 0	*M*
R Lyræ	18 51·9	43 48 N.	Feb. 28,		*M*
δ Cephei	22 25·0	57 50 N.	Mar. 2,	23 0	*M*

M signifies maximum; *m* minimum.

Meteor-Showers

Amongst the meteor-showers of the season are the two following:—Near δ Virginis, R.A. 192°, Decl. 1° N; near ξ Sagittarii, R.A. 280°, Decl. 17° S. The latter radiant gives very swift streak-bearing meteors.

GEOGRAPHICAL NOTES

TWO letters have been received in Vienna from Dr. O. Lenz, dated, one from Lake Tanganyika in September, and the other from the River Shiré in December. This indicates that the Austrian Expedition has taken an unexpected route to the east coast. When Lenz and his companions left Kasonge, on the Upper Congo, on June 30, they made for Tanganyika, arriving at Capt. Hore's station on the west shore on August 7. Crossing to Ujiji, Dr. Lenz found that it was impossible to proceed northwards to the Albert Nyanza and Emin Pasha, on account of the Arab raids and the state of things in Uganda. Instead, therefore, of proceeding eastwards to Zanzibar, he travelled, by land apparently, to the south end of Lake Tanganyika, along the Stevenson road to Lake Nyassa, down that lake to the Shiré, and thence by the Zambesi to Quillimane. The two letters will be published in the next number of the *Mitteilungen* of the Vienna Society, and will doubtless contain a good deal of information of interest.

TIPPOO TIP, about whom we have heard so much recently in connection with the Emin Pasha expedition, seems to be rather

© 1887 Nature Publishing Group